


Serial Number 09/991,641

IN THE ABSTRACT: ✓

Please amend the abstract as indicated by the clean copy in Appendix B and the marked-up copy in Appendix C, attached hereto.

IN THE TITLE:

Please delete the original title and substitute therefor the following new title:

 -MULTISTAGE STORAGE SYSTEM FOR INTERMITTENT OR UNSTABLE  
VOLTAGES-.

REMARKS

Reconsideration of the application is respectfully requested for the following reasons:

1. Formalities

The specification and abstract have been revised to place the application in proper U.S. format and to correct various grammatical and idiomatic errors. Because the changes are all formal in nature, it is respectfully submitted that the changes do not involve new matter.

2. Rejection of Claims 1-18 Under 35 USC §112, 2nd Paragraph

This rejection has been addressed by re-writing claims 1-18 in proper U.S. format, including deletion of indefinite alternative recitations, and deletion of the phrase "related."

3. Rejection of Claims 1-18 Under 35 USC §102(b) in view of U.S. Patent 5,610,499 (Rogers)

This rejection is respectfully traversed on the grounds that the Rogers patent does not disclose or suggest a multi-stage circuit for storing voltages which utilizes at least two different storage devices, one of which has a smaller capacity for use when expedited charging is required, and the other of which has a larger capacity so as to provide storage higher voltages when possible, *the larger capacity storage device being charged after the lower capacity device.*

While the system of Rogers includes multiple storage devices, the storage devices have different purposes than those of the claimed invention, and are connected in essentially the opposite manner. In Rogers, the high capacity storage device is a starter battery which is charged first, while the other storage device is charged from a separate source to serve as a "run battery" for operating vehicle systems after start-up. As explained in col. 4, lines 9-20 of the Rogers patent:

*In all cases, the run battery is preferably recharged using a conventional battery charger which is powered from an external line source. . . . This permits replacing the amp-hour charge that was removed from the run battery by the vehicle loads with a source of electricity external to the vehicle. The external electricity source typically costs less per unit of energy than petroleum and alcohol based fuels. . . .*

In the system of Rogers, only the starter battery is charged by the alternator, which only provides a charge-maintenance current to the run battery. In contrast, the second storage device of the claimed invention is designed to store most of the output of the DC power source, with the first storage device being charged first by the same storage device to permit immediate **low** voltage operation. Such immediate low voltage operation would be useless in the system of Rogers, which initially requires full power for start-up.

Because the Rogers patent fails to disclose or suggest several positively-recited features of the claimed invention, withdrawal of the rejection of claims 1-18 in view of the Rogers patent is respectfully requested.

4. Rejection of Claims 1-18 Under 35 USC §102(b) in view of U.S. Patent No. 6,160,389 (Watts)

This rejection is respectfully traversed on the grounds that the Watts patent fails to disclose or suggest a multiple stage storage system having two storage devices, much less one in which a small capacity storage device is charged first for providing quicker, *albeit* low voltage, output, followed by charging of a larger capacity storage device.

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Having thus overcome each of the rejections made in the Official Action, withdrawal of the rejections and expedited passage of the application to issue is requested.

Respectfully submitted,

BACON & THOMAS, PLLC

A handwritten signature in black ink, appearing to read 'By [unclear]', with a long horizontal line extending to the right.

By: BENJAMIN E. URCIA  
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Date: May 12, 2003

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APPENDIX A  
(Clean Copy Of Amended Claims)

19 ~~18~~. (New) A multi-stage storage system for intermittent or unstable voltages, comprising:  
a DC power supply;  
a first storage device connected to receive DC charging voltages from the DC power supply;  
at least one second storage device also connected to receive DC charging voltages from the DC power supply;  
wherein the first storage device has a lower capacity than the second storage device; and  
wherein the second storage device is not charged until the lower-capacity first storage device has been charged and is available for low voltage output.

20 ~~19~~. (New) A multi-stage storage system as claimed in claim ~~18~~<sup>19</sup>, further comprising a one-way energy limit circuit and a charging control circuit each connected in series with the second storage device for regulating supply of charging voltages to the second storage device.

21 ~~20~~. (New) A multi-stage storage system as claimed in claim ~~18~~<sup>19</sup>, further comprising an isolation diode connected in series between the first and second storage devices.

22 ~~21~~. (New) A multi-stage storage system as claimed in claim ~~18~~<sup>19</sup>, further comprising a voltage and current regulator connected between the DC power source and the first storage device.

23 ~~22~~. (New) A multi-stage storage system as claimed in claim ~~18~~<sup>19</sup>, further comprising a current regulator connected between the DC power source and the first storage device.

24 ~~23~~. (New) A multi-stage storage system as claimed in claim ~~18~~<sup>19</sup>, further comprising a voltage regulator connected between the DC power source and the first storage device.

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- 25 24. (New) A multi-stage storage system as claimed in claim 18<sup>19</sup>, further comprising a zener diode connected in parallel between the DC power source and the first storage device.
- 26 25. (New) A multi-stage storage system as claimed in claim 18<sup>19</sup>, further comprising an isolation diode connected in series between the DC power source and the first storage device.
- 27 26. (New) A multi-stage storage system as claimed in claim 18<sup>19</sup>, wherein the first storage device is a secondary battery.
- 28 27. (New) A multi-stage storage system as claimed in claim 18<sup>19</sup>, wherein the first storage device is a capacitor.
- 29 28. (New) A multi-stage storage system as claimed in claim 18<sup>19</sup>, wherein the second storage device is a secondary battery.
- 30 29. (New) A multi-stage storage system as claimed in claim 18<sup>19</sup>, wherein the second storage device is a capacitor.
- 31 30. (New) A multi-stage storage system as claimed in claim 18<sup>19</sup>, wherein the second storage device is a primary battery.
- 32 31. (New) A multi-stage storage system as claimed in claim 18<sup>19</sup>, further comprising a zener diode connected in series between the DC power source and the second storage device.
- 33 32. (New) A multi-stage storage system as claimed in claim 18<sup>19</sup>, further comprising a current-regulating diode connected in series between the DC power source and the second storage device.

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**APPENDIX B**  
**(Clean Copy Of Amended Abstract)**

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A multi-stage energy storage system includes two different storage devices having different voltage outputs, the lower voltage storage device being charged first to enable expedited supply of low voltages.

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**APPENDIX C**  
**(Marked-Up Copy Of Amended Abstract)**

[A random input multistage voltage trickle storage system functioning by voltage difference of two or more than two stages comprised of two or more than two types of storage device, to store DC source converted from city power, or charging energy randomly inputted from unstable source such as solar cell or a windmill generator.] A multi-stage energy storage system includes two different storage devices having different voltage outputs, the lower voltage storage device being charged first to enable expedited supply of low voltages.